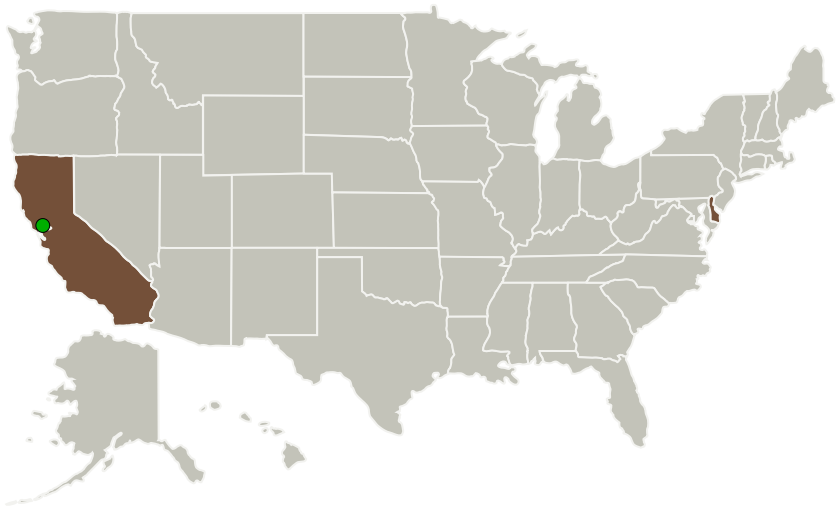
Echo Time Distance Measurements for Nanosatellite Arrays, Phase I

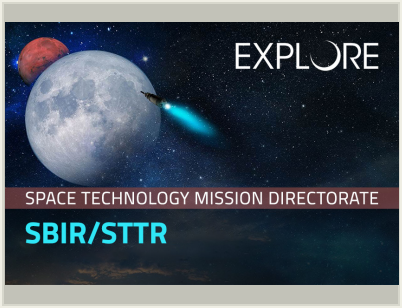
Completed Technology Project (2012 - 2012)

Project Introduction

This proposal presents a technique for the precise determination of distance between nodes of a planar array of nanosatellites for synthetic aperture and sensor array applications. The proposed effort will result in a navigational technique that can precisely determine the positions of nanosatellite sensor nodes in the array. The proposed innovation enables higher performance and low cost sensor array development, while fitting within the size constraints, limited communication ability, and operational duty cycles of nanosatellites. The technique presented depends on echo time measurement between a satellite and its neighbors. That is, the satellite generates a RF signal that is received by its neighbors and echoed back. Differential measurements are taken to subtract out delays introduced by the propagating hardware. The distances between pairs of neighboring satellites can then be combined with bearing and orientation information to precisely map the spatial arrangement of the satellite array. Combined with bearing and orientation measurements, this technique solves the precise position determination (PPD) problem using nanosatellites; that is, position determination within the sensor array with accuracy suitable for synthetic aperture formation.

Primary U.S. Work Locations and Key Partners





Echo Time Distance Measurements for Nanosatellite Arrays, Phase I

Table of Contents

Small Business Innovation Research/Small Business Tech Transfer

Echo Time Distance Measurements for Nanosatellite Arrays, Phase I

Completed Technology Project (2012 - 2012)

Organizations Performing Work	Role	Type	Location
American Academy of Aeronautics	Lead Organization	Industry	Dover, Delaware
Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations	
California	Delaware

Project Transitions

February 2012: Project Start

August 2012: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138112)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

American Academy of Aeronautics

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

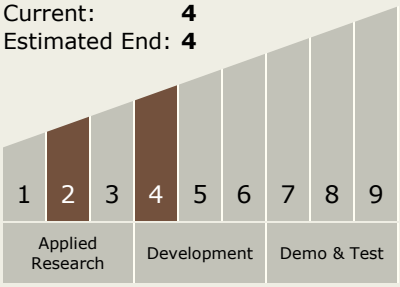
Carlos Torrez

Principal Investigator:

Periklis Papadopoulos

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



Echo Time Distance Measurements for Nanosatellite Arrays, Phase I

Completed Technology Project (2012 - 2012)

Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
  - TX03.1 Power Generation and Energy Conversion
    - TX03.1.1 Photovoltaic

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System